

WHAT IS CLAIMED:

1. A modular grafting system, comprising:

a bifurcated main body including a superior end and an inferior end, the superior end being sized to engage walls defining an aortic arch portion of vasculature, the inferior end including a first leg and a second leg, the first leg being longer and having a smaller diameter than the second leg; and

an extension component, the extension component being sized to mate with the second leg after placement of the main body within vasculature.

2. The modular grafting system of claim 1, the main body further comprising a plurality of stents attached thereto.

3. The modular grafting system of claim 2, the main body including an exterior and an interior, wherein certain of the plurality of stents are attached to the exterior of the main body.

4. The modular grafting system of claim 2, the main body including an exterior and an interior, wherein certain of the plurality of stents are attached to the interior of the main body.

5. The modular grafting system of claim 2, wherein the stents are self-expanding.

6. The modular grafting system of claim 2, at least one stent including structure for attaching the main body to vasculature.

7. The modular grafting system of claim 1, wherein the first leg is sized to extend to and engage an interior surface of a vessel branching from the aortic arch.

5 8. The modular grafting system of claim 7, the first leg further including anchoring structure that attaches the first leg within the branch vessel.

9. The modular grafting system of claim 1, further comprising a delivery catheter sized to receive the main body and to be advanced through a branch vessel
10 extending from the aortic arch.

10. The modular grafting system of claim 9, the delivery catheter including structure for releasing the superior end and second leg of the main body within the aortic arch.

15 11. The modular grafting system of claim 10, the delivery catheter being further adapted to configure the first leg within the branch vessel.

12. The modular grafting system of claim 9, further comprising a
20 supplemental delivery catheter sized to receive the extension component and to be advanced upstream within an aorta to the aortic arch.

13. The modular grafting system of claim 12, the supplemental delivery catheter including a releasing mechanism that accomplishes deploying the
25 extension component at least partially within the second leg of the main body.

14. The modular grafting system of claim 13, the extension component further comprising a first anchoring device and a second anchoring device, the first anchoring device being sized to engage the second leg of the main body and the
30 second anchoring device being sized to engage interior walls of the aorta.

15. The modular grafting system of claim 14, wherein the anchoring devices are self-expanding.

5 16. A method to treat vasculature involving a modular grafting system including a delivery catheter configured to receive a main graft body, comprising:

gaining access to vasculature;

advancing the delivery catheter within vasculature and through an innominate artery branching from an aortic arch; and

10 releasing the main graft body from the delivery catheter so that a first portion of the main graft body resides in the innominate artery and a second portion resides in the aortic arch.

15 17. The method of claim 16, further comprising anchoring the first portion within the innominate artery.

18. The method of claim 16, further comprising anchoring the second portion within the aortic arch.

20 19. The method of claim 16, wherein the main graft body is bifurcated including a main opening, a first leg and a second leg, further comprising configuring the first leg in the innominate artery and configuring the second leg in the aortic arch.

25 20. The method of claim 16, wherein the main graft is bifurcated including a main opening, a first leg and a second leg, further comprising configuring the main opening in the aortic arch.

30 21. The method of claim 20, further comprising anchoring the main opening in the aortic arch.

22. The method of claim 16, wherein the modular grafting system further includes a supplemental delivery catheter configured to receive an extension component having a first end and a second end, further comprising advancing the supplemental delivery catheter upstream an aorta to the aortic arch.

23. The method of claim 27, further comprising releasing the extension component within the aortic arch.

24. The method of claim 23, further comprising configuring the first end of the extension component within the main graft body.

25. The method of claim 23, further comprising anchoring the second end of the extension component to vasculature.